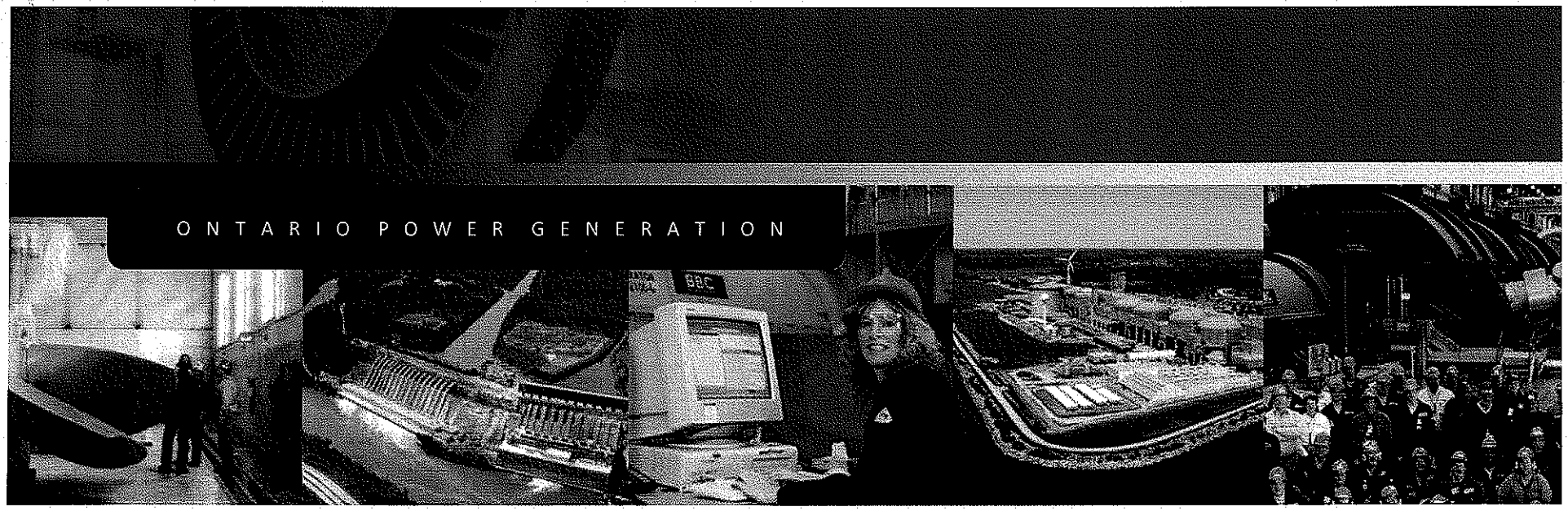


Michigan Senate - Energy and Technology Committee

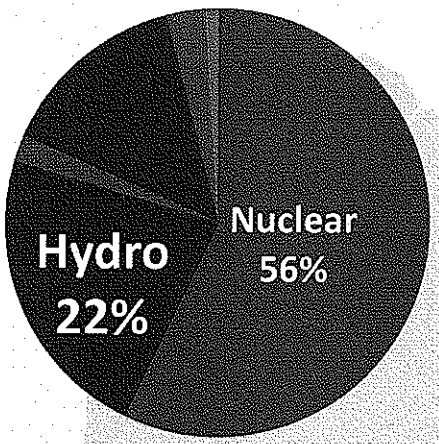
Ontario Power Generation

Deep Geologic Repository

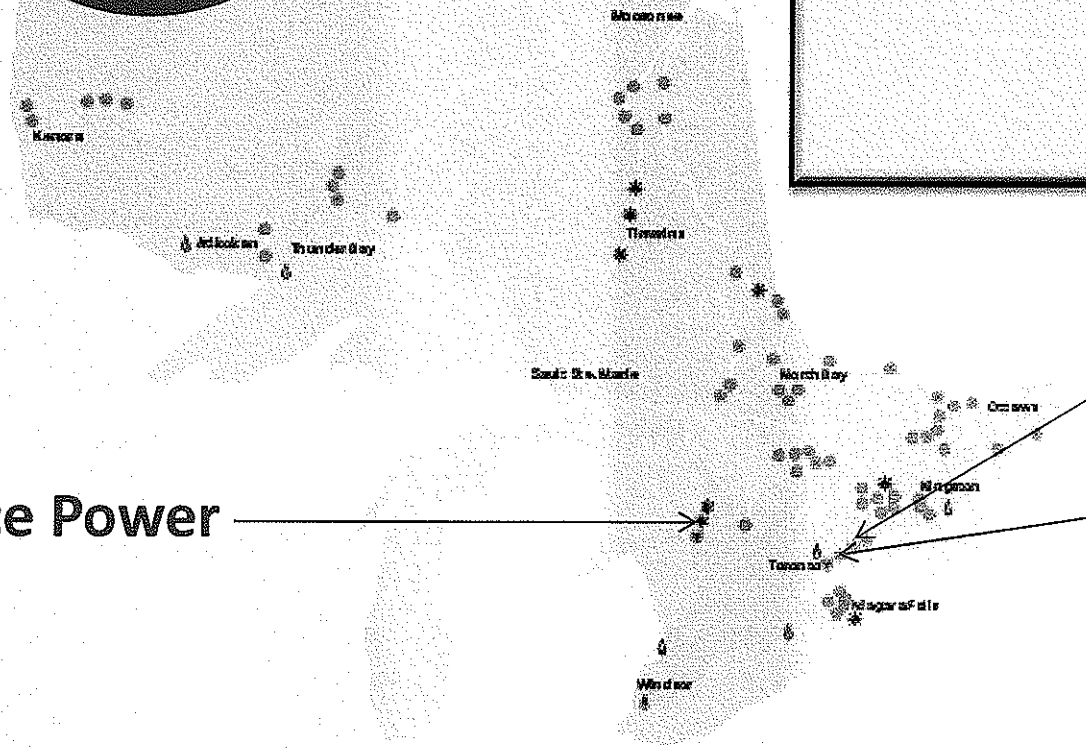
Low and Intermediate Level Waste

ONTARIO POWER GENERATION

Ontario Power Generation



- Owned by the Government of Ontario, Canada
- 65 hydroelectric
- 3 nuclear stations in Ontario
- 95 per cent virtually emission free



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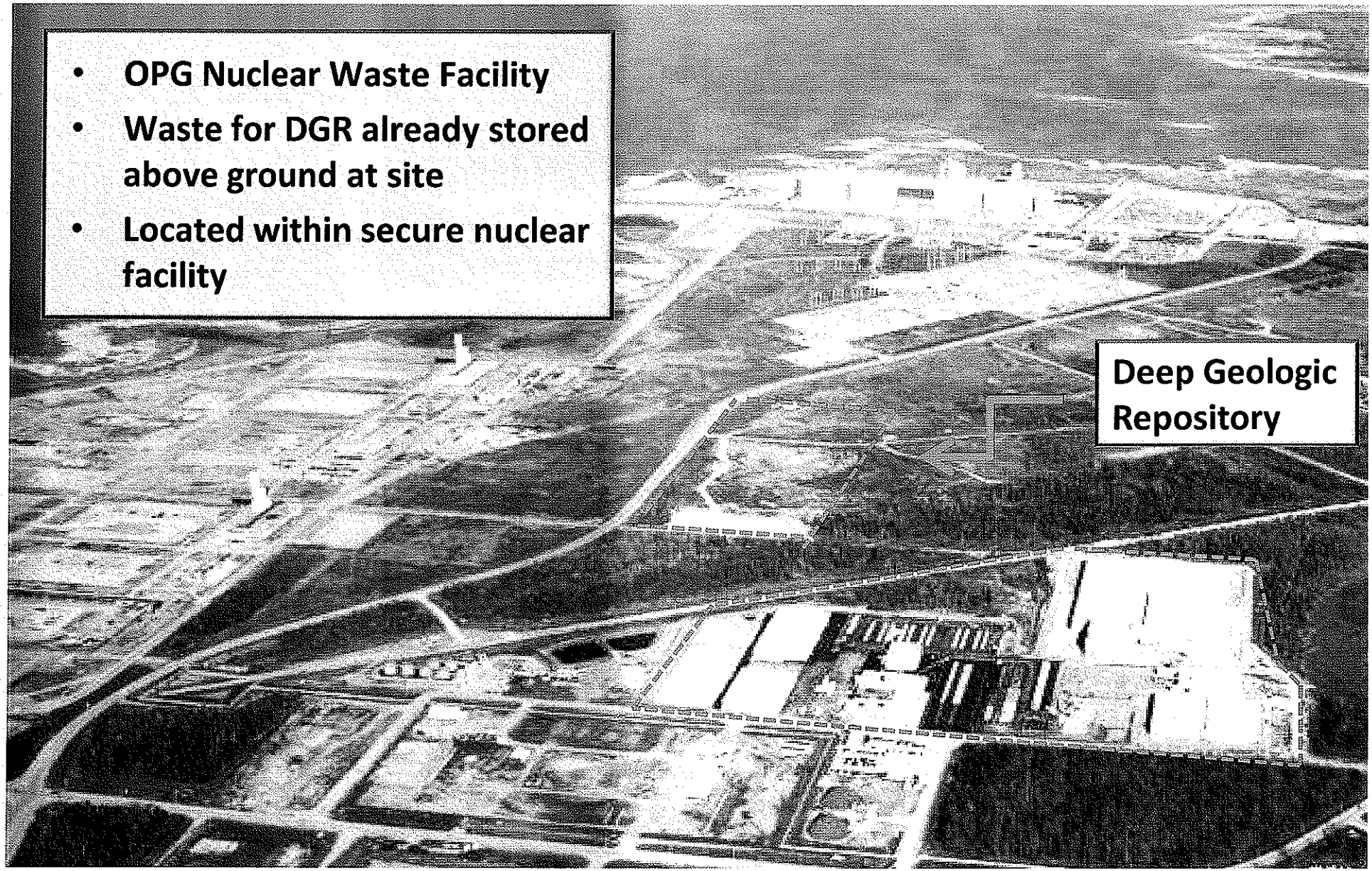
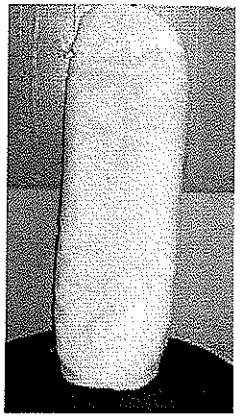
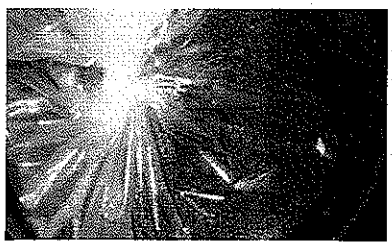
Bruce Nuclear Site and Waste Facility



Deep Geologic Repository Waste

Low level waste does not require shielding





Filters and small resin beads

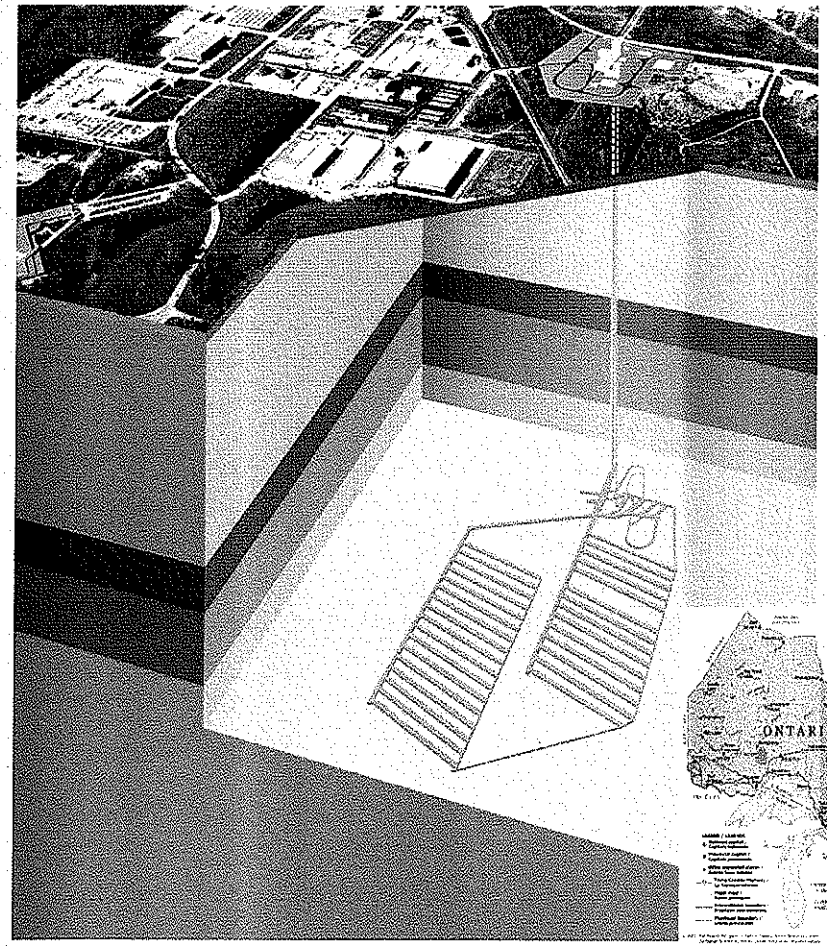
- Spent Nuclear Fuel **WILL NOT** be stored in this facility
- Waste from only Ontario reactors
- Low Level Waste
  - Similar to normal industrial waste
  - Paper/Plastic/Gloves and clothing
  - Tools/Wood/concrete
  - Ash/compacted
  - Minimally contaminated
- Intermediate Level Waste
  - 10 per cent by volume
  - Filters and resin
  - Refurbished reactor components

ONTARIO POWER GENERATION

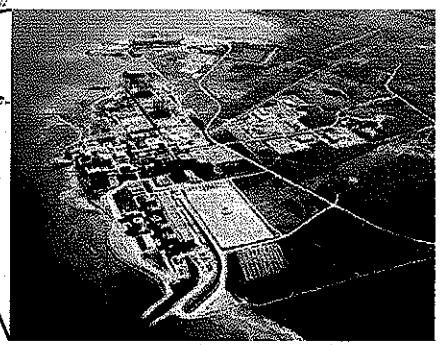
Why a DGR and why here?

- OPG is responsible to provide a solution
- Internationally-accepted best practice
- Excellent geology to safely store and isolate from Lake Huron and drinking water
- Waste already stored at site
- Process initiated by a willing and informed host community
- EA – no significant adverse environmental impact

DGR: Geology at a Glance



- Sedimentary Sequence (2755' thick)
  - 34 Bedrock Formations
  - Paleozoic age (390 – 540Ma)
  - Diffusion Dominated
- Repository Horizon 2,230'depth
  - Limestone (88')
  - Shale cap barrier (656')
- Main shaft .62 miles from lake
- Closest point to lake is .75 miles

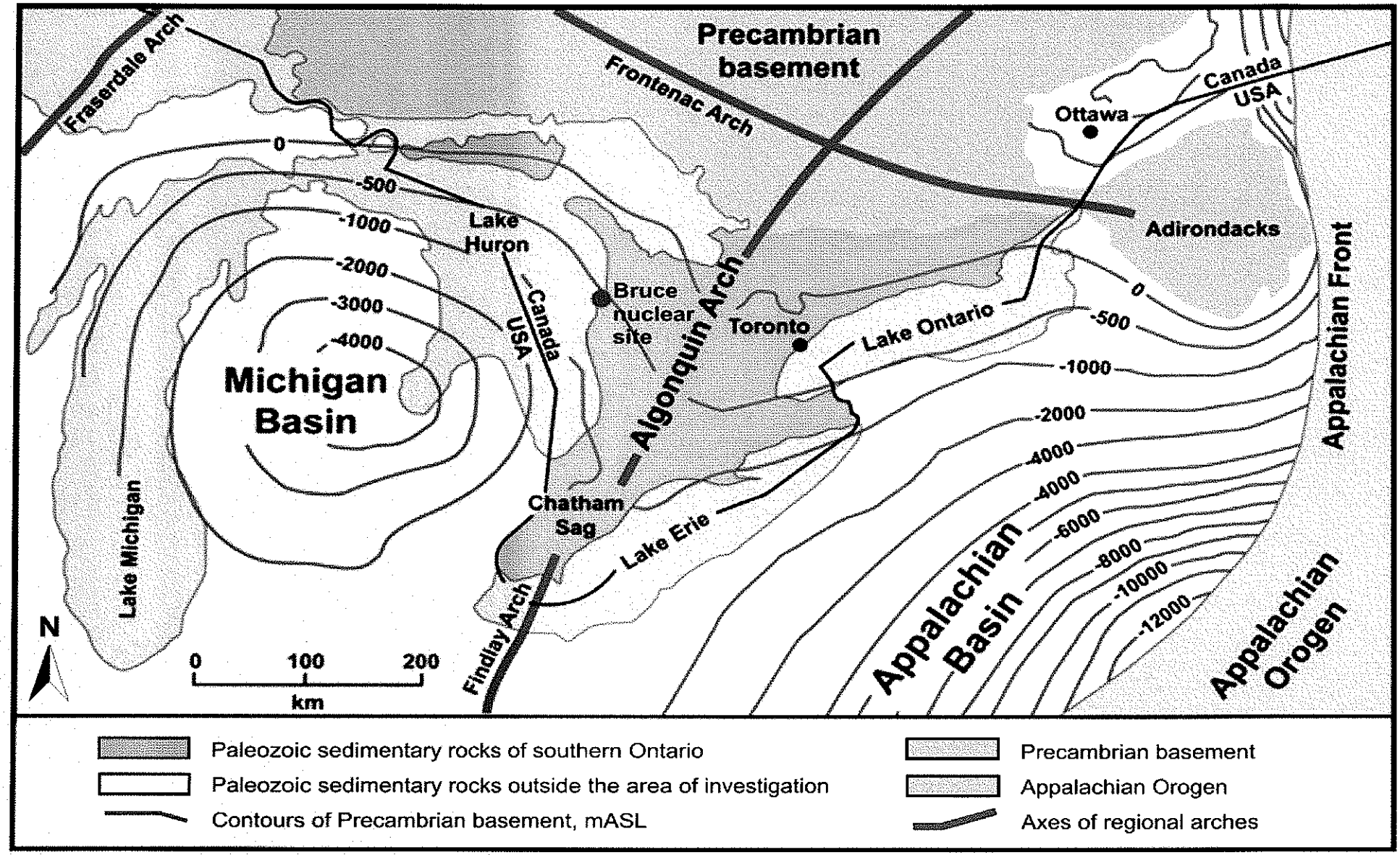


ONTARIO POWER GENERATION

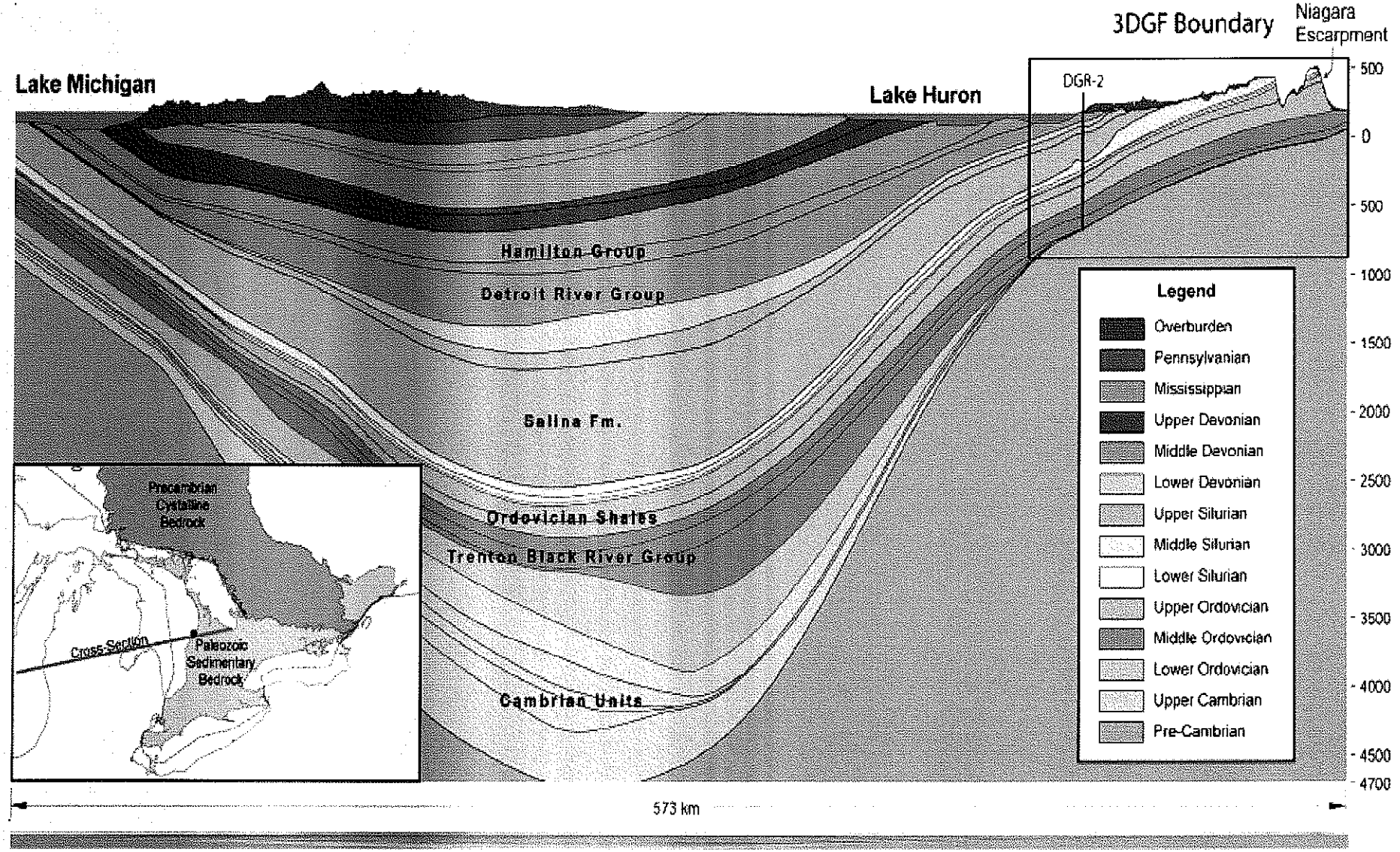
Favorable Geologic Site Features

- Predictable – undeformed - 450 million years old
- Multiple Natural layers – low permeability
- Ancient rock – no glacial impact
- No natural resources – oil or gas
- Seismically quiet – similar to Canadian shield
- Geomechanically safe – stable and dry
- Groundwater resources safely isolated

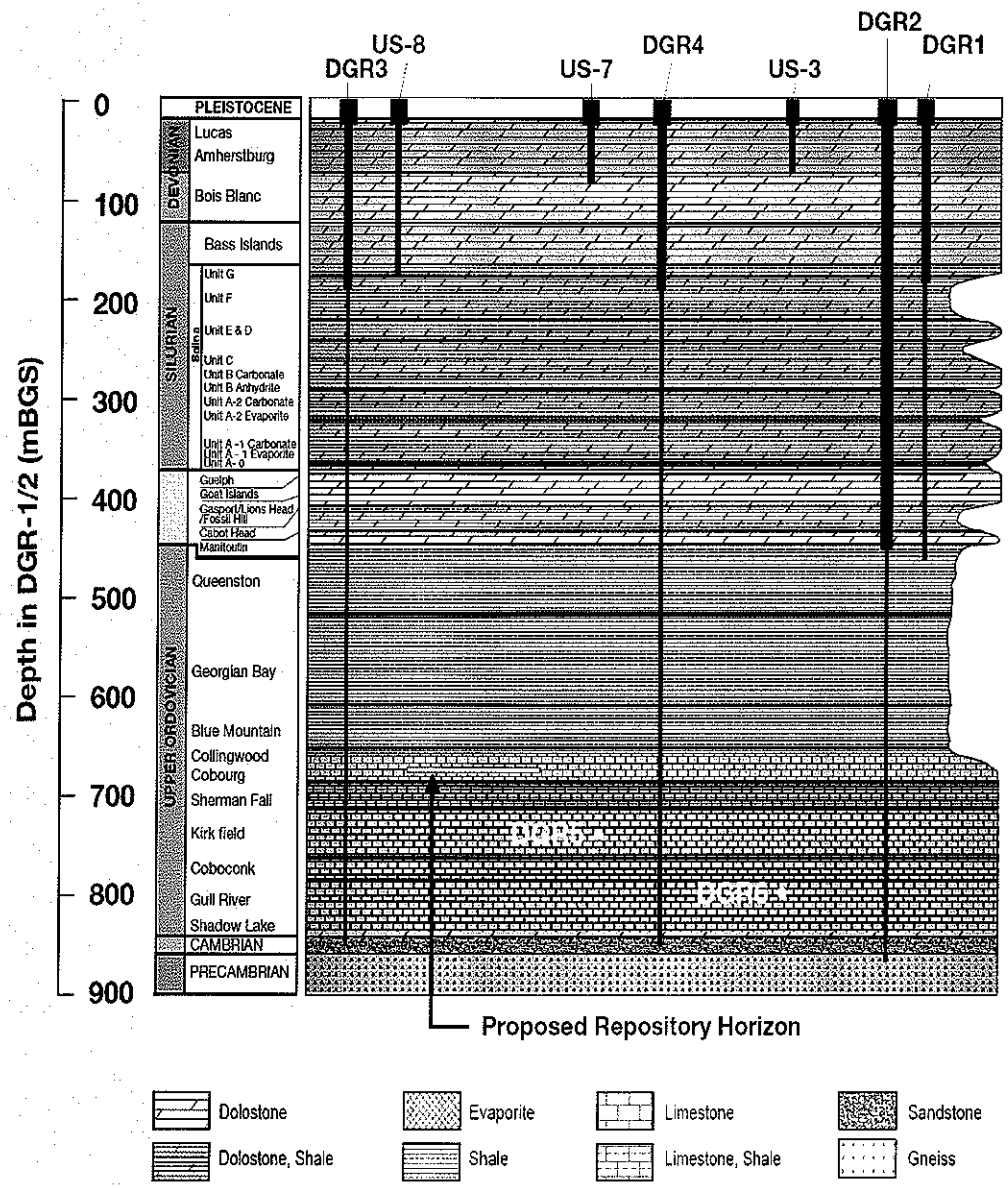
A Geologic Story – Large and Stable



Geologic Traceability



DGR: Natural Attributes



- Thick sedimentary bedrock formations undeformed and traceable.
- Multiple thick bedrock formations that possess barrier properties.
- Ancient and stable saline groundwater groundwater system not in contact with surface.
- Host formation geomechanically strong, dry and stable.
- Natural resource potential low.
- Area of low seismic hazard.
- Contaminant transport is diffusion dominated - ground/surface water protected.

ONTARIO POWER GENERATION

Geoscience Teamwork

Numerous organizations and individuals have contributed to the successful completion of Site Characterization activities and Geosynthesis:

Geosynthesis
AECOM Canada Ltd.

Descriptive Geosphere Site Model
Geofirma Engineering Ltd.

Technical Oversight
•Geoscience Review Group (**GRG**)
- Jacques Delay (Andra)
- Joe Pearson
- Andreas Gautschi (Nagra)
- Derek Martin (U. of Alberta)

Specialists & Consultants
- **Itasca** – *geology, 3DGFM, Geomechanical Stability Analysis*
- **Worthington Groundwater** – *karst*
- **Fracture Systems Ltd.** – *EDZ*
- **AMEC Geomatrix Inc.** – *Seismic Hazard Assessment*
- **Hydro Resolutions** – in-situ hydraulic testing

Canadian and International Universities
- **University of Toronto** – *glacial systems modelling*
- **University of Waterloo** – *hydrogeological modelling, geology, hydrogeochemistry*
- **University of Ottawa** – *groundwater and porewater chemistry, porewater extraction techniques*
- **University of New Brunswick** – *diffusion testing and method development, hydrogeochemistry*
- **University of Alberta** - *geomechanics*
- **University of Bern** – *groundwater and porewater geochemistry, porewater extraction techniques*
- **University of Washington** – *glacial erosion*
- **Pennsylvania State University** – *cap rock integrity*
- **Monash University** – *outcrop fracture mapping*

ONTARIOPOWER GENERATION

U.S.A. Engagement and Input

- Michigan NGO and individuals engaged in:
  - Draft EA guidelines
  - Scoping hearing
  - Current comment period

- Michigan briefings in 2009/2011
  - Elected representatives and officials
  - Department of Environmental Quality
  - NGO groups

U.S.A. Review

Environmental Protection Agency

- reviewed submission and provided comments and request for further information

> *"In comparison to other international programs, the proposed DGR site, at 2,230 feet beneath the Bruce Nuclear site, is the deepest planned facility in the world, is bounded by the thickest assemblage of low permeable cap rocks, and is isolated from surface and drinking water" (July 24, 2012)*

Department of Environmental Quality – Lansing

- OPG provided detailed geoscientific data

> *"In summary, the RMD (Resource Management Division) has reviewed the EIS (Environmental Impact Statement) and supporting radiological and geological studies and has no technical objections to the conclusions reached in the many various studies." (Aug., 2, 2012)*

Over a Decade of Public Engagement

- Open and transparent
- Initiated at the request of the community
- Community poll – majority support
- 100's of meetings, briefings, open houses, tours and communications
- Informed and willing community
- Officials at all levels -elected term over term
- First Nations and Métis engagement

Results of Environmental Assessment

- DGR Project is not anticipated to have any significant residual adverse effects on human health or the environment, including:
  - No residual adverse impact on Lake Huron (both groundwater and surface water)
  - No adverse effect to Inverhuron Provincial Park or visitation to the park
  - No adverse effect on tourism
  - Adverse noise effects at Baie du Dore during site preparation and construction were not considered significant
  - No adverse effects on livestock or wildlife due to Project noise
  - No impact on property values
- Follow-up monitoring to verify predictions of assessment